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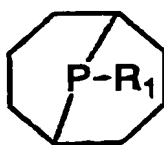
CLAIMS

- 5 1. The use of a phosphorus containing ligand as a ligand for a metathesis catalyst in a catalysed metathesis reaction wherein the phosphorus containing ligand is a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the
- 10 heterocyclic ring structure of the heterocyclic organic compound.
- 15 2. The use of a phosphorus containing ligand in the preparation of a catalyst containing the ligand, which catalyst is for use in a metathesis reaction, wherein the phosphorus containing ligand is a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound.
- 20 3. The use of either one of claims 1 or 2 wherein the metathesis reaction is a homogenous metathesis reaction.
- 25 4. The use of any one of the preceding claims wherein the phosphorus containing ligand comprises a phosphine ligand.
5. The use of claim 4 wherein the ligating phosphorus atom is also bound to a further moiety which is an organyl and which is not part of the heterocyclic ring structure.

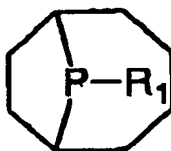
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6. The use of any one of claims 1 to 4 wherein the phosphorus containing ligand is a 9-phosphabicyclo[3.3.1]nonane of formula 2a or a 9-phosphabicyclo[4.2.1] nonane of formula 2b or mixtures thereof:



(2a)



(2b)

wherein  $R_1$  is H or an organyl.

7. The use of claim 6 wherein  $R_1$  is  $-C_{20}H_{41}$ .

8. The use of claim 6 wherein  $R_1$  is cyclohexyl.

9. The use of any one of the preceding claims wherein the metathesis reaction is a reaction selected from the group consisting of cross metathesis, ring-opening metathesis polymerisation and ring-closing metathesis.

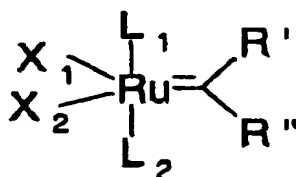
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10. A metathesis catalyst which includes a phosphorus containing ligand which is a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound.

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11. A compound of formula 3:



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.....(3)

wherein

$\text{L}_1$  is a neutral electron donor ligand;

$\text{L}_2$  is a phosphorous containing ligand in the form of a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound;

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$\text{X}_1$  and  $\text{X}_2$  are independently selected from an anionic ligand; and

$\text{R}'$  and  $\text{R}''$  are independently selected from H and an organyl.

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12. The compound of claim 11 which is a homogeneous metathesis catalyst.

13. The compound of either one of claims 11 or 12 wherein  $\text{L}_1$  is the same as  $\text{L}_2$ .

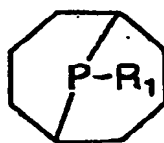
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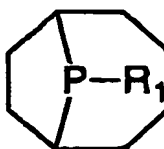
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14. The compound of any one of claims 11 to 13 wherein the phosphorus containing ligand of  $L_2$  comprises a phosphine ligand.

5 15. The compound of claim 14 wherein  $L_2$  is a 9-phosphabicyclo[3.3.1]nonane, of formula 2a, or a 9-phosphabicyclo[4.2.1]nonane of formula 2b or mixtures thereof:



..... (2a)



..... (2b)

15 wherein  $R_1$  is H or an organyl.

16. The compound of claim 15 wherein  $R_1$  is  $-C_{20}H_{41}$ .

17. The compound of claim 15 wherein  $R_1$  is cyclohexyl.

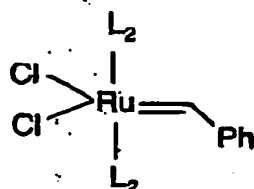
20 18. The compound of any one of claims 11 to 17 wherein  $X_1$  and  $X_2$  are each independently selected from halide.

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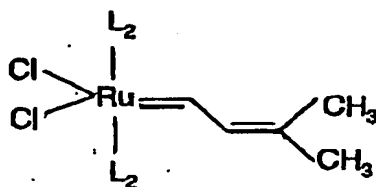
19. The compound of claim 11 which is a compound of formula 7:



..... (7)

- 5 wherein  $L_2$  is the same or different and is as defined in claim 11.

20. The compound of claim 11 which is a compound of formula 8:



..... (8)

- 10 wherein  $L_2$  is the same or different and is as defined in claim 11.

- 15 21. The compound of either one of claims 19 or 20 wherein  $L_2$  is as defined in claim 15.

22. The use of a compound of any one of claims 11 to 20 in a metathesis reaction.

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23. The use of claim 22 wherein the metathesis reaction is a homogeneous metathesis reaction selected from the group consisting of cross metathesis ring-opening metathesis polymerisation and ring-closing metathesis.
24. A catalysed metathesis reaction wherein at least one olefinic compound is subjected to metathesis in the presence of a compound of claim 11.
25. The reaction of claim 24 wherein the compound of claim 11 is formed *in situ*.
26. A metathesis product formed by the reaction of either one of claims 24 or 25.

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